

Lecture 3

Business, Reformation and Enlightenment

Reading:

de Roover (1951,1955), Howell, Pfeizenamaier; de Bruyn

Topics

- The Scholastic Analysis of Monopoly
- The Reformation and Business
- Petrus Ramus and the 16th Century Revolt Against Scholasticism in University Education
- Was Isaac Newton an Arian?

Review Natural Law from Week 2

- Is Monopoly a violation of Natural Law?
 - The Meaning of Natural Law
 - **What is the penalty for violation of a natural law?**
 - Compare these vaguely defined penalties with those for civil and divine law
 - natural law relates to the cohesion of human social order (see Goya's *Saturn*)
- Does 'stirring up the hornet's nest' comes from violation of natural law?



More on the Scholastics: The Concept of Monopoly

Origin of the Concept

de Roover (1951) attributes the first use to Aristotle (*Politics*) whereas the Latin *monopolium* originates the English terminology. Aristotle uses two Greek words translating as “one seller” and provides two examples.

The example de Roover's selects conflicts with usual presentations in (financial) economics where which emphasizes the use of option contracts by Thales to secure the olive presses at harvest (vs. leases in de Roover)

Aristotle has another example involving a Sicilian iron merchant who was able to gain control of available stocks

Evolution of the Concept

□ Roman Law

All monopolies and conspiracies to raise prices are illegal

▪ The Scholastics

- Primary concern is social justice
- “Just price” was a central concept to the schoolmen
- Monopoly was usually interpreted broadly to apply to the control of the supply of a commodity (including labour) by a few as well as one person → violation of just price.
- Only monopolies granted by the sovereign that benefit the public good are acceptable. (How to gauge whether such grants are in the ‘public good’!?)

Sources of Monopoly

- Monopoly can originate from activities to defraud the market, such as cartels, that result in an artificially high (low) price
 - Unlike usury, which involve a specific borrower and lender, the costs of monopoly are usually societal due to the large number of transactions.
- Monopoly can originate from patents, licenses and other protections provided by governments.
 - Early trading companies, such as HBC, VOC etc. were organized as grants of trading monopoly.
 - VOC shipwrecks link
 - Bank of England, South Seas Co., Mississippi Company
- Monopoly can originate from economies to scale and scope.

For later reference: Modern Monopolies

- Canadian Health Care (CMA?)
- Various prescription drugs (patent laws)
- Broadcasting Spectrum
- Nickel and Tin (?)
- Crown land
- **Economic theory maintains that monopoly results in lower levels of output and higher prices resulting in monopoly profit**
- **On grounds of social justice, are Monopolies everywhere an evil that need to be corrected?**

Business and the Evolution of Christianity

- What role did the increasing scope and influence of commercial activity have on the emergence of the Protestant Reformation?
 - Detailed consideration of the evolution of ‘scholastic economics’ reveals the adaption of Roman Catholic doctrine to accommodate the needs of business up to and following the Reformation
 - See de Roover ‘Scholastic Economics’ reading
 - To the schoolmen: “Economics ... was viewed as an ethical and legal matter involving the application of natural law to civil contracts” → developing rules of justice in social matters
- Protestant Reformation was a complex and multi-faceted historical process that cannot be reduced to one-dimensional explanations.
 - Role of ‘free will’ and conflict with doctrine of ‘predestination’

Johannes Gutenberg (1400-1468), the printing press and the Reformation

- One of the most important technological revolutions in history begins with the introduction of the printing press with movable type by Gutenberg
 - Idea first conceived 1439 with one (or more?) printing presses in full operation by 1450
 - The time period between initial conception and full operation is unclear, especially the 1444-50 period
- The initial projects for the press involved commercial and religious endeavors
 - One money losing project was to produce the first printed version of the Bible
 - The commercial side which was profitable consisted of producing texts (likely Latin grammars) and **copies of indulgences**
 - **Did the resulting increased supply of indulgences impact Luther?**

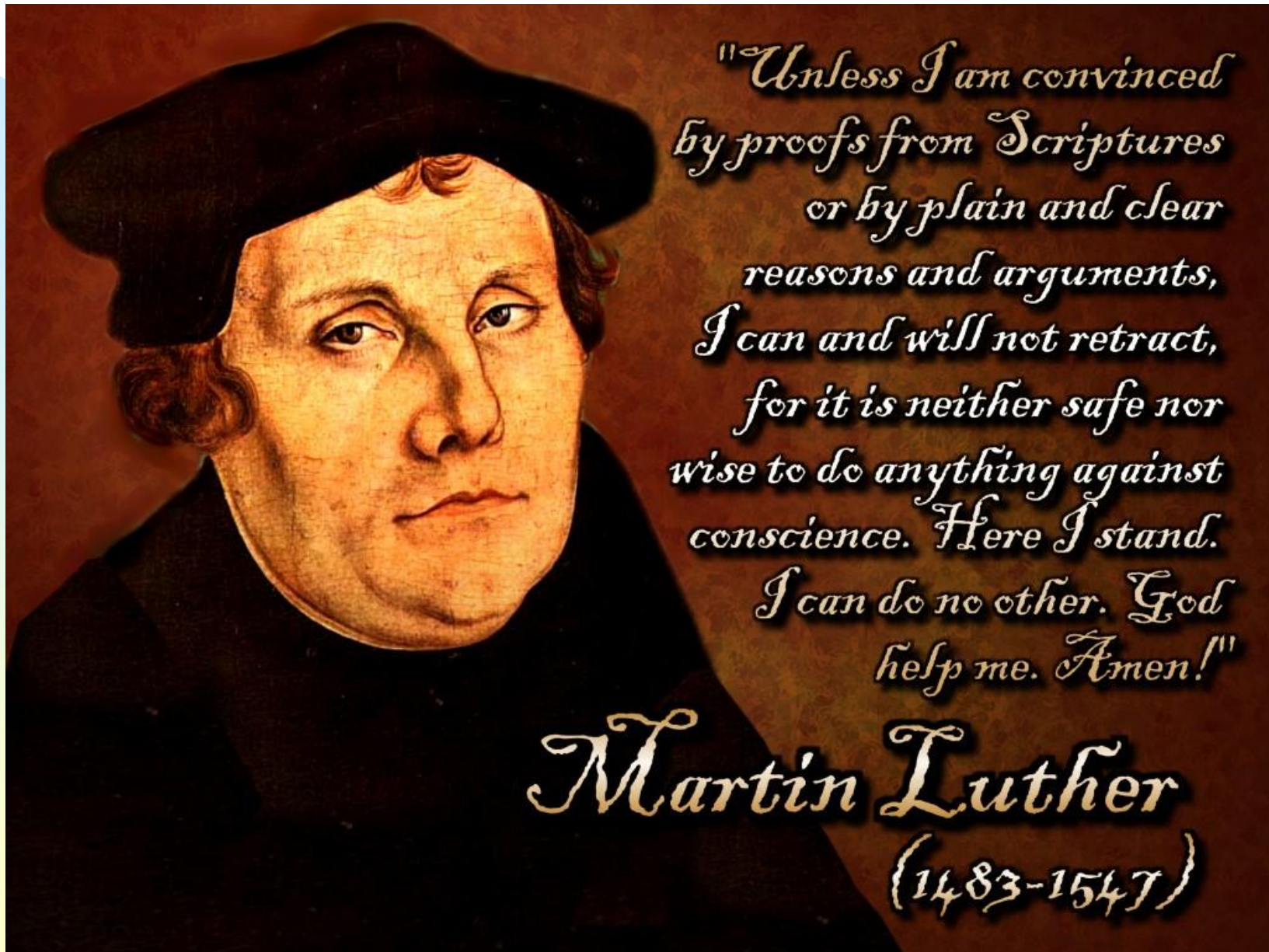
Copper etching of Gutenberg Page from Gutenberg Bible by Albrecht Mentz

The true Effigies of Iohn Guttemberg Delineated from the Original Painting at Mentz in Germanie.



A timeline of important dates in Reformation

- Martin Luther (1483-1546) (German) and John Calvin (1509-64) (French/Swiss)
 - 31 Oct 1517, the 95 Theses posted
 - Luther translates Bible into German (1522-4)
 - *Institutes of the Christian Religion* (by Calvin in Latin 1536, in French 1541)
 - Both Calvin and Luther had certain undesirable aspects in their teachings.
 - French Protestants were mostly Reformed/Calvinists
 - French wars of religion between Protestants and Catholics 1562-98
- Edict of Nantes, April 13, 1598 (Henry IV of France) granting French Protestants (Huguenots) rights in a Catholic nation, ending a period of French civil war that started with a massacre of Protestants in 1562
 - *Repeal of Edict of Nantes* (1685)



*"Unless I am convinced
by proofs from Scriptures
or by plain and clear
reasons and arguments,
I can and will not retract,
for it is neither safe nor
wise to do anything against
conscience. Here I stand.
I can do no other. God
help me. Amen!"*

Martin Luther
(1483-1547)



Calvin at age 53 (2 years before his death in 1564)

Engraving by René Boyvin (1525–1598) of Angers

In 1553, Calvin denounced as a heretic the Spaniard Michael Servetus, who had fled to Geneva after being condemned by Catholic authorities in France. This contributed to Servetus subsequently being burned at the stake for heresy.

Fundamental differences: Luther vs. Calvin

- The 95 theses of Luther (1517) – issued at the time that Luther was professor of moral theology at the U. of Wittenberg was **concerned with the sale of indulgences by the Church** to reduce the punishment for sins (either for the living or the deceased)
 - This was defining event for the Protestant Reformation in the Holy Roman Empire – initially Lutherans and Calvinists professed similar doctrine, deviations emerged late 16th to early 17th centuries.
 - Doctrine of Lutheranism expressed in *Book of Concord* (1580)
 - Lutheranism maintains the doctrine of justification (three solas): “by grace alone, through faith alone, on the basis of Scripture alone”.
- Main differences between early Calvinists and Lutherans
 - Presence of Christ at the Eucharist (Holy Communion)
 - Catholics, Anglicans and Lutherans believe in presence
 - Sola scriptura: Bible is the only source of authority on worship
 - Essential feature of the Reform churches, elements of church service not specifically mentioned in the Bible are unacceptable
 - Use of God's law
 - Calvinists/Reformers maintain ‘good works’ need for redemption, Lutherans maintain only God can determine

The Early Branches of the Protestant Reformation

- Protestants involved in the Reformation were not a homogeneous grouping – four general branches can be identified – common thread is rejection of the Catholic Church, headed by the Pope, as the source of divine authority and acceptance of the 5 solae (solas)
 - **Lutheran (1517):** Evolved substantively after the death of Luther
 - **Anabaptist (1527):** Most extreme and persecuted of Protestant branches; argued, against infant baptism and literal interpretation of the Sermon on the Mount
 - Survives in modern times as Mennonites, Hutterites, Amish and German Baptists – some elements adopted by modern Baptists
 - **Reformed (1519):** Includes Calvinism, starts with Zwingli in 1519
 - Often referred to as the Calvinist-Arminian continuum
 - **Church of England (1534):** Started with Henry VIII rejecting the authority of the Pope with subsequent confiscation of considerable Church property
 - Christianity has a long history in Britain as early as 3rd century
 - Had 'catholic' elements, claiming a universal church with continuity traceable to the early Apostolic Church
 - Accepted reform elements as reflected in use of *Book of Common Prayer*

The Wars of Religion 1522-1648

- ▣ Propelled by the emergence of Protestant creeds starting in 1517, the wars of religion continued until the mid-17th century
 - ▣ Important events include:
 - ▣ The German Peasants War (1524-5) in which approx. 100,000 poorly armed peasants were slaughtered
 - ▣ The Thirty Years War (1618-48), waged throughout Europe, especially in Germany, Italy, S. Netherlands, Bohemia (also France, Sweden and Denmark)
 - The total number of fatalities from warfare, famine and the plague is estimated at 8,000,000 ranking this (in terms of percentage of fatalities to total population) among the most destructive in European history
 - ▣ Peace of Westphalia (1648) was a series of treaties marking the end of the wars of religion in Europe
 - English civil war (1642-51)

St. Bartholomew's Day Massacre (1572)

- 24 August 1572, starting with the murder in Paris of a Huguenot leader, Admiral de Coligny, the massacres spread through Paris and later to other cities and the countryside, lasting for several months.
- Paris at this time was fiercely Catholic, Protestants were massing an army of 4000 troops just outside the city at the time; Protestant protests growing
- Final Protestant death toll estimates vary, possibly 2000 in Paris and 10,000 in the rest of France

St. Bartholomew's Day Massacre of 1572 (by Francois Dubois) – occurred in Paris, subsequently spreading to other areas, initially aimed at leaders of the Huguenots gathered in Paris to celebrate the royal marriage of the Protestant prince Henry of Navarre to the Catholic daughter of the Queen



Who was Petrus Ramus (1515-1572)?

Reading: Howell

Protestant victim of the St. Bartholomew's Day massacre (1572).

- ▣ Struggled against the educational procedures of his time and against the hostility that the unorthodox always bring upon themselves
 - ▣ Protested against the Aristotelian approach used by the scholastics as over-elaborate, contrived and artificial
 - ▣ Mathematics as studied in universities should not be more than a systematic treatment of mathematical methods used by merchants, navigators, surveyors and engineers.





Petrus Ramus (1515-1572)

French humanist, critic of scholasticism and reformer of university teaching – Ramist school of thought had influence beyond the 16th century

Influence of Ramus on Universities

- Transition to vernacular instruction replacing Latin
→ beginning of growth of use oriented subjects and gradual decline of Aristolean, humanist approach of scholastics
- Ramists spread throughout N. Europe universities
→ circa 1600 influential in starting the first school of applied mathematics (engineering) at Leiden in Holland.
- Ramists influenced Francis Bacon and Adam Smith

The Rise of Early Modern Science

- Supplementary Sources: Toby Huff, *The rise of early modern science* (1993) which extends the seminal 7 volume *Science and Civilization in China* by Joseph Needham; in contrast to work by Nathan Sivin
 - Huff explores why modern science arose in the West and not in Islamic or Chinese civilizations → recognizes the importance of the legal concept of corporation (also fundamental to business relations)
 - Recognizes the Copernican revolution as the beginning of “a major transformation in the Western conception of the universe and the individual’s place within it” (p322)
 - Gives a central role to the importance of universities in the development of modern science in the West

Leonardo da Vinci (1452-1519) and Michelangelo (1475-1564) at the Crossroads

□ Contributions of da Vinci

- Leonardo was an historically important polymath recognized as a path breaking painter, sculptor, inventor, engineer, anatomist, etc.
 - Leonardo was the epitome of a 'Renaissance man'
 - Important paintings: John the Baptist (1513-6) (Louvre); (Mona Lisa (1503-5) (Louvre); Last Supper (1498) (Convent of Santa Maria della Grazie, Milan); Adoration of the Magi (1481) (Uffizi); Baptism of Christ (1472-5) (Uffizi)
 - Conceptual inventions (not implemented): parachute; helicopter; tank; double hull ships

□ Contributions of Michelangelo

- A contender with Leonardo as the epitome of 'Renaissance man' – painter, sculptor and architect
 - Paintings and sculptures: David (1504); Sistine chapel (1505-12); The Last Judgment (1534-41)

Timeline of rise of early modern science

- Nicolaus Copernicus (1473-1543)
 - *On the Revolutions of the Heavenly Spheres* (*De Revolutionibus orbium coelestium* (1543, 1st ed. Nuremberg, 2nd ed. 1566, Basel), though the ideas were formulated c. 1510 and circulated as early as 1514
 - Copernicus appears after Leonardo da Vinci, the “Renaissance man”
 - The sun rather than the earth is at the center of the universe
 - This is considered one of the most important scientific hypotheses in history
 - Copernicus did not pose a profound challenge to the predominance of the Church in intellectual matters until some years after his death

Opposition to the Copernican system

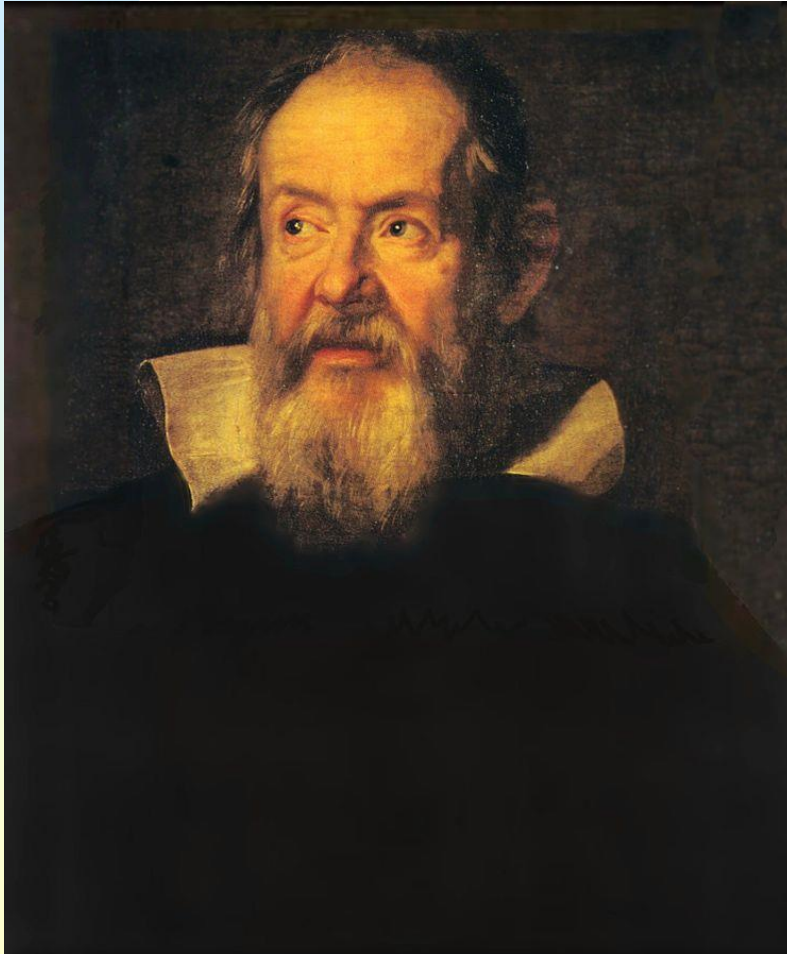


- The notion that the sun was the center of the universe was advanced by certain Greek astronomers in the 4th C. BCE
 - Islamic astronomers advanced similar notions in the 10th century
 - Ptolemaic astronomy (c. 150) by Alexandrian astronomer proposed a geo-centric model of universe with earth as the center
- The Copernican system – that the planets orbit the sun (not the earth) and that the moon orbits the earth did not gain many adherents until many decades after his death (see trial of Galileo)
- At the time of Copernicus, there was only limited distinction between astronomy and astrology

From Copernicus to Newton

- Johannes Kepler (1571 – 1630)
 - German, worked in Graz, Prague and Linz
 - Postulated that the Earth and planets travel about the sun in **elliptical** orbits. He gave three fundamental laws of planetary motion in 1609.
- Galileo Galilei (1564-1642)
 - Italian, worked in Pisa, Padua and Florence
 - Pioneered use of quantitative experiments with results analyzed mathematically (then unknown method in European thought)
 - Improvements to telescope led to discoveries in astronomy.

Galileo Galilei (1564-1642)



Johannes Kepler (1571-1630)



Kepler, Tycho Brahe (1546-1601) and Astronomy

Kepler in *Mysterium Cosmographicum* (*The Cosmographic Mystery*, 1596), was a defense of Copernicus that made major advances on the Copernican system by proposing elliptical planetary motions around the sun

Kepler displaced Ptolemaic elements of Copernicus

Kepler served as an assistant to Brahe from 1600 until Brahe died in 1601, use of the astronomical observations of Brahe was essential to the results of Kepler

Brahe had proposed the Tychonic system where the moon orbited the earth, the planets orbited the sun but, incorrectly, that the sun orbited the earth

Kepler maintained the religious belief that God had created the world according to an intelligible plan and his work demonstrated that God's plan could be discovered by the use of reason

This religious approach also motivated Isaac Newton



The Trial of Galileo Galeili (1633)

- Galileo is a key figure in the evolution of 'modern science' from philosophy and religion
 - As late as the 18th century, scientists were referred to as philosophers
- With Galileo, the acceptance of heliocentrism and the Copernican system rose to the attract attention of the Roman Inquisition (started 1615 and conducted throughout 17th century)
 - Initially Galileo had the approval of the Church hierarchy
 - Trial was sparked by the publication by Galileo *Dialog concerning the Two Chief World Systems* (1632)
 - Heliocentric system in conflict with Psalm 96:10:
 - Say among the nations, "The Lord reigns." The world is firmly established, it cannot be moved;
 - Tried by the Roman Inquisition in 1633 and found to be "vehemently suspect of heresy"
 - Sentenced to house arrest for the remainder of his life and publication of his works was banned within the Roman Catholic realm



Why did modern science emerge in the West and not in the Islamic world or China (or India or Japan)?

Supplementary Reading: Needham question .zip file

- In the context of China and Europe, this is referred to as the 'Needham question' (see earlier Needham reference)
- At the time of Copernicus, both Islamic astronomy and Chinese technology were superior to Europeans
 - This generally agreed upon starting point raise many questions about the conception of science, in what ways did Islam and China differ from 'the West, at what point and why did the emergence of 'modern science' matter.
 - For example, is the emphasis on advances in astronomy and optics up to and including Newton warranted support for the claims of Western superiority? Or is commercial applicability of technology that generated the Industrial Revolution the appropriate inflection point?

Who was Isaac Newton (1643-1727)?

- Father of the Enlightenment?
 - Precise starting point for Enlightenment is not agreed → some identify an Age of Reason before, dating 1690 (John Locke) as start
 - Loose beginning mid 1600's to late 1700's
 - Followed by Romanticism
 - Developed “fluxions” (differential calculus) by 1666 → the *Principia* published in Latin in 1687, first English ed. 1729.

Newton, Boyle and the relationship between science and Christian belief

- Robert Boyle (1627-1691), a founder of modern chemistry and the Royal Society, was originator of Boyle's Law (in a closed system, pressure of gas increases as the volume of a container decreases),
 - Devout Anglican, as director of East India Company, was responsible for the spread of Christianity to the East
 - Boyle's will endowed the Boyle lectures intended to defend the Christian belief against "notorious infidels, namely atheists, deists, pagans, Jews and Muslims"
 - No mention was to be made in the lectures controversies between Christians were not to be mentioned
 - Boyle's lectures provided a public forum for considering the relationship between Christianity and 'natural philosophy', i.e., scientific inquiry
- With Boyle begins a century of intellectual conflict over the possibility of a 'scientific' basis for Christianity
 - The resulting English debates included the Newtonians, David Hume, and the dissenters such as Price and Priestley



Isaac Newton

**Portrait for Royal
Society by Charles
Jervas**

**Elected fellow of
Royal Society in 1672**

**Knighted in 1705 by
Queen Anne**

Was Isaac Newton an Arian?

Reading Downloadable Background Notes on class webpage

Not clear that Newton was an Arian, this claim originates after his death

- **Who was Arius (256-336)?**

- Credited with starting the religious opposition to the Catholic Church's view of trinitarianism.
- Viewed Jesus as a man

- *Homoousios vs. Homoiousios*

- Father and Son as one substance vs. not 'One in being'

- **Council of Nicaea (First Council 325)**

- Source of the Nicene Creed embedding homoousis in baptismal and catechetical teaching

Council was influenced by Emperor Constantine (explicit rejection of Arianism removed in Constantinople version of the Creed)



Dissenters, the Clarendon Code and the Test Act

- The Clarendon code was a set of four Acts passed after the Restoration to restrict activities of those worshipping outside the Church of England
 - Corporation Act (1661): officers of municipalities to take sacraments at Church of England
 - Act of Uniformity (1662): Book of Common Prayer to be used by all ministers in England and Wales – resulted in more than 2000 ministers leaving the Church and marking the beginnings of the Dissenters
 - Conventicle Act (1664): restricted assemblies of more than five persons for purposes of non-Anglican worship
 - Five Mile Act (1665): restricting dissenting ministers from practicing close to previous places of worship
- Clarendon Code was superseded by the Test Act (1673) – only those taking communion in Church of England eligible for public employment
 - Newton was likely in violation of the Test Act

Newton and the Newtonians

- Newton and the Newtonians → the dispute with Leibnitz
 - Newton had the essence of the methods of fluxions by 1666.
 - 1668 method of integration by infinite series made public (not published).
 - Paris 1675 Gottfried Wilhelm Leibniz independently (?) evolves first ideas of his differential calculus,
 - 1677 Newton describes some of his mathematical discoveries to Leibniz
 - 1684 Leibniz publishes first paper on calculus
- In the 1690s Newton's friends proclaimed the priority of Newton's methods of fluxions.
 - Supporters of Leibniz assert he had communicated the differential method to Newton, although Leibniz claimed no such thing.
 - Newtonians assert, rightly, that Leibniz had seen papers of Newton's during a London visit in 1676
 - A violent intellectual dispute sprang up → Leibniz attacks Newton's theory of gravitation and his ideas about God and creation
- Dispute had not ended by Leibniz's death in 1716.

Isaac Newton's personal papers

- Many features of Newton's legacy were protected by the Newtonians
 - Papers on Alchemy (and chemistry)
 - Papers on Religious subjects
 - Newton wrote over 1.4 million words on religious topics, especially interpreting Book of Revelation
- Bulk of the non-scientific papers were sold at a Sotheby's auction in 1936
 - See downloadable reading for history of the scientific and non-scientific papers
- Newton took a position at the Mint in 1696 and served as Master of the Mint from 1700-1727

Source of the Book of Revelation

Reading: Downloadable Notes

- ▣ Debate over the source of text, possibly of apostolic origin, similar texts in early Jewish Apocalyptic literature
 - ▣ Only accepted into canon at Council of Carthage in 394 AD
 - ▣ Not all parts of the early church accepted the inclusion of *Revelation*

Emphasizes the kingdom of God, prophesies a new heavens and a new earth, and proposes a dualism of ages

No other book of the New Testament has so many references to prophets and prophecies

Revelation and Apocalypse

- **Apocalypse** in the terminology of early Jewish and Christian literature: a revelation of hidden things given by God to a chosen prophet;
 - Often used to describe the written account of such a revelation.
 - Apocalypse translates from Greek as 'Revelation'
- Apocalyptic literature
 - Concerned with resurrection of the dead, judgment day, heaven and hell
 - Apocalyptic beliefs predate Christianity, appear in other religions **including Islam**
 - Apocalypse technically refers to the unveiling of God, not to all of the destruction of the world which will accompany God's Revelation of Himself to Humankind.

The Resurrection (1715-6), Sebastiano Ricci (Rev. 11:12)



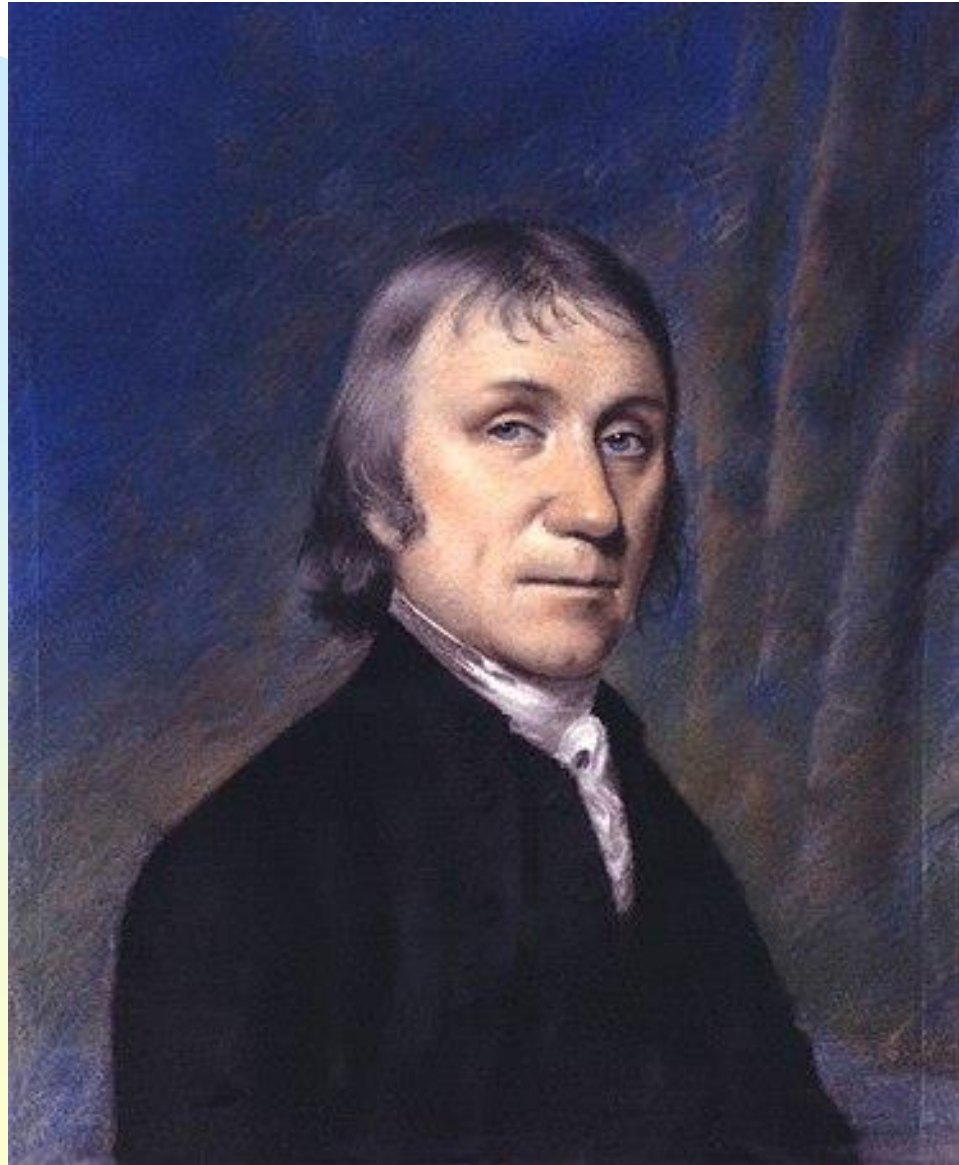
Important Quotes from the Book of *Revelation*

□ Book of Revelation

- “And he laid hold on the dragon, that old serpent, which is the Devil, and Satan, and bound him a thousand years, and cast him into the bottomless pit, and shut him up, and set a seal upon him, that he should deceive the nations no more, till the thousand years should be fulfilled” (20:2)
- “they lived and reigned with Christ a thousand years. But the rest of the dead lived not again until the thousand years were finished. This is the first resurrection. Blessed and holy is he that hath part in the first resurrection: on such the second death hath no power, but they shall be priests of God and of Christ, and shall reign with him a thousand years.” (20:4-6)

Millenarianism

- Millenarians generally hold the beliefs:
 - The struggle between the forces of good and evil will come to a climax (usually in the near future), and good will triumph and institute a reign of righteousness
 - During the reign of righteousness historical wrongs will be rectified, injustice and oppression will cease, and those who profit from injustice and oppression will get what's coming to them.
 - Righteous believers will play a crucial role, either by helping to defeat the forces of evil, or by sharing in the millennial reign, or both.



**Joseph Priestley, FRS
(1733-1804)
by Ellen Sharples (1794)**

**Discoverer of Oxygen,
other gases and soda
water**

**Unitarian dissenter,
friend of Rev. Richard
Price and prominent
millenarian**

Important Millenarians

- There is no single source for millenarianism
 - Some argue that it is based on the Jewish apocalyptic tradition.
- Joseph Priestley (1733-1804) and Richard Price
 - Priestley credited with discovering oxygen
 - Like Price, a leading religious dissenter and on American side in War of Independence
- Millenarians in History
 - Shakers, Jehovah's Witnesses
 - Modern Examples of Cults
 - Aum Shinri Kyo in Japan; Euro-Canadian Order of the Solar Temple